

We claim:

- 1 1. A method for reconstructing data, clocked at a symbol rate, from a signal
2 which has been distorted and attenuated by transmission of a transmission link,
3 comprising the following steps:
4 a) amplifying the signal amplitude attenuated by the transmission;
5 b) filtering high-frequency interference frequencies above the symbol rate;
6 c) discretizing the analog signal by means of an oversampled analog/digital
7 converter;
8 d) performing a cable approximation by means of a digitally implemented cable
9 approximation filter in order to obtain an equalized signal; and
10 e) interpolating and filtering the equalized signal by means of an interpolation and
11 filter unit; and
12 f) decimating the interpolated and filtered signal by means of a decimator which is
13 arranged in the control loop of a phase-locked loop for recovering the original data
14 from the equalized signal.
- 1 2. The method according to Claim 1, wherein the analog/digital converter
2 oversamples the supplied data signal n-times in order to transform low-frequency
3 noise into a higher-frequency spectrum, particularly above the symbol rate.
- 1 3. The method according to Claim 1, wherein the step of filtering of high-
2 frequency interferers is performed by means of a digital filter which is arranged
3 between the analog/digital converter and the cable approximation filter.
- 1 4. The method according to Claim 1, further comprising the step of reducing of
2 the data rate of the discrete signal by at least a factor of $m=2$, better by a factor of 5-10
3 or more, in order to obtain a decimated signal.

1 5. The method according to Claim 1, further comprising the step of filtering of
2 low-frequency components below a predetermined lower cut-off frequency,
3 particularly of direct-current components, by means of a digital filter.

1 6. The method according to Claim 5, wherein low-frequency components are
2 filtered before the cable approximation is performed.

1 7. The method according to Claim 1, wherein the cable approximation is
2 performed by means of a digital FIR filter.

1 8. The method according to Claim 1, wherein amplification of the signal
2 amplitude and the cable approximation is controlled by a digitally implemented
3 equalizer control unit.

1 9. The method according to Claim 1, wherein the sets of coefficients required for
2 setting the cable approximation are temporarily stored in a memory device.

1 10. The method according to Claim 1, wherein the interpolation and low-pass
2 filtering takes place outside a control loop of a subsequent phase-locked loop for clock
3 and data recovery.

1 11. The method according to Claim 1, wherein a regenerated clock running
2 synchronously with the signal clock is generated by means of the phase-locked loop.

1 12. The method according to Claim 1, wherein the decimation is controlled with
2 the aid of a peak detector and of a phase detector.

1 13. The method according to Claim 1, wherein the clock control characteristic of
2 the phase-locked loop is adjusted by means of a timing loop filter.

1 14. The method according to Claim 1, wherein the recovered data are output
2 synchronously with the regenerated clock.

1 15. A device for reconstructing data clocked at a symbol rate from an analog signal
2 which has been distorted and attenuated by transmission of a transmission link,
3 comprising the following:
4 a) an amplifier for amplifying the signal amplitude attenuated by the transmission;
5 b) a low-pass filter for filtering high-frequency interferers above the symbol rate;
6 c) an analog/digital converter for discretizing the analog signal;
7 d) a digital cable approximation filter for generating an essentially equalized, discrete
8 signal;
9 e) a digital interpolation and filter unit for interpolating and filtering the equalized
10 signals; and
11 f) a phase-locked loop for recovering the data from the equalized signal, a digital
12 decimator being arranged in a control loop of the phase-locked loop.

1 16. The device according to Claim 15, wherein the analog/digital converter
2 oversamples the analog data signal n-times in order to transform low-frequency noise
3 into a high-frequency spectrum, particularly above the symbol rate.

1 17. The device according to Claim 15, wherein following the analog/digital
2 converter, a digital low-pass filter is provided for filtering high-frequency interferers
3 above the symbol rate.

1 18. The device according to Claim 17, wherein following the low-pass filter, a
2 decimator is provided in order to obtain a decimated, discrete signal for a subsequent
3 high-pass filter.

1 19. The device according to Claim 15, wherein a high-pass filter is provided for
2 filtering low-frequency components below a predetermined lower cut-off frequency,
3 particularly of direct-current components.

1 20. The device according to Claim 15, wherein a digital cable approximation filter,
2 particularly a FIR filter, is provided for signal equalization.

- 1 21. The device according to Claim 20, wherein an equalizer control unit is
2 provided for controlling the setting of the amplifier and the characteristic of the cable
3 approximation filter.
- 1 22. The device according to Claim 21, wherein the sets of coefficients for
2 controlling the cable approximation filter are temporarily stored in a memory device.

1 23. A device for reconstructing data clocked at a symbol rate from an analog signal
2 which has been distorted and attenuated by transmission of a transmission link,
3 comprising the following:
4 a) an amplifier receiving a signal and generating an amplified signal;
5 b) a low-pass filter receiving the amplified signal and generating a filtered signal;
6 c) an analog/digital converter receiving the filtered signal and generating a digital
7 signal;
8 d) a digital cable approximation filter receiving the digital signal and generating an
9 equalized digital signal;
10 e) a digital interpolation and filter unit receiving the equalized digital signal and
11 generating an interpolated signal; and.
12 f) a phase-locked loop receiving the interpolated signal, wherein a digital decimator
13 being arranged in a control loop of the phase-locked loop.

1 24. The device according to Claim 23, wherein the analog/digital converter
2 oversamples the analog data signal n-times in order to transform low-frequency noise
3 into a high-frequency spectrum, particularly above the symbol rate.

1 25. The device according to Claim 23, further comprising a digital low-pass filter
2 coupled between said analog/digital converter and said digital cable approximation
3 filter.

1 26. The device according to Claim 25, further comprising a decimator coupled
2 between said digital low pass filter and said digital cable approximation filter.

1 27. The device according to Claim 25, further comprising a high-pass filter
2 coupled between said decimator and said digital cable approximation filter.

1 28. The device according to Claim 25, wherein the digital cable approximation
2 filter is a FIR filter.

- 1 29. The device according to Claim 28, further comprising an equalizer control unit
2 coupled with the amplifier and the cable approximation filter.
- 1 30. The device according to Claim 29, further comprising a memory device for
2 storing the sets of coefficients for controlling the cable approximation filter coupled
3 between the equalizer control unit and the cable approximation filter.